Nucleonica Comments IV 25.07.2007

General:
Use the new Nucleonica logo for the Server-Error Message box.

1) Administration, User maintenance, user list Overview:
    - Sorting order by first click: use ascending for all text columns (surname, etc.)
    - Pending orders: Just change the text: *Do you really want to delete user 112?* to *Do you really want to delete pending order from user 112?*
    - We need the *Administrator* menu in the menu bar
2) Upgrade your Account: The new pending order alert should link directly to Admin/Pending Orders not to Users
3) Reference data:
    - There is a bug in the display of nuclides with the Karlsruhe colour theme. Many grounds stats have a white triangle (see Ag95). This is wrong. To understand how to solve this problem, see the appendix.
    - The isoME is not relative to the ground state but to the IT-daughter (*Raymond will correct this*: correction for BE and AW for n- and p-isomers)
    - The prompt gamma tab should be de-activated (light grey)
    - On the print tab, the checkbox for prompt gamma should be disabled.
4) On the portal, the prompt gamma should be disabled and greyed out
5) The package features are in the UsersType table. The feature chart on the web site should be automatically generated from this table. The table is the reference.
6) When Binding –Energy colour theme is selected, and we zoom into a particular area, can we show the actual binding energy in the boxes (e.g. 4.35 MeV)
7) When spin & parity colour theme is selected, and we zoom into a particular area, can we show the actual spin and parity in the boxes (e.g. $3/2^+$)
8) In the Select colour themes use following ordering (with group separator-):

Standard
Karlsruhe
Strasbourg

General Electric
JAERI

Spin
Spin
Parity
Spin+parity

Binding Energy

9) Nuclide Explorer, Karlsruhe theme: we need a legend box for Cluster Emission CE
10) In the Karlsruhe chart select Ta180. Then go to filter decay modes, then check stable/primordial. The ground state should be grey and the metastable state should show red with a small blue triangle.

Also in the nuclear data retrieval, Nuclide Search, select Ta and stable/primordial. We get
Ta180…
Ta180..
This is wrong – it should be Ta 180m

11) Nuclide Chart, Binding Energy:
    - For unknown, the mini chart doesn't reflect NE chart

- Look at Tb145m: in NE it is black for unknown, but in Reference data the isomer has the same colour as the ground state.
- For Tb144 and Tb144m both are red in Reference data, which is correct, but the isomers box border is missed.
- For Cl38 the ground- and m-state should have different colours
  BE_{Cl38g} = 8.50548 Mev : red (correct)
  BE_{Cl38m} = 8.48781 Mev : red (wrong) in Ref.Data (in NE correct: dark blue)

12) Spin integral/half-integral, select only unknown and look at La124 and La126:
The isomer box isn't readable and the text colour cannot be changed: the text colour of the NE background should be editable. We need a black border around the background colour box for contrast. In addition, *Restore* should restore the original colour.
The mini chart doesn't reflect the state of NE

13) Spin magnitude (similar to table for BE):
Select unknown only: Hs267m is omitted in the chart and doesn't be counted
Sg263 in Ref.Data doesn't look like in NE

14) Parity: Hs267m is unknown but actually odd in NE and even in Ref.Data
Subitly, I was no more able to go to Ref.Data trough the right click menu on NE

15) Spin+Parity:
- Use the J^{π} notation also for the numerical values in the legend as below
- Use a different colour for $0^+ \leq J^{\pi} < 2^+$ (e.g. dark green) as for $2^- < J^{\pi} \leq 0^-$

$J^{\pi} \leq 8^-$
$8^- < J^{\pi} \leq 6^-$
$6^- < J^{\pi} \leq 4^-$
$4^- < J^{\pi} \leq 2^-$
$2^- < J^{\pi} \leq 0^-$
$0^+ \leq J^{\pi} < 2^+$
$2^+ \leq J^{\pi} < 4^+$
$4^+ \leq J^{\pi} < 6^+$
$6^+ \leq J^{\pi} < 8^+$
$8^+ \leq J^{\pi}$
Unknown

- After selecting none, if I check $J^{\pi} \leq 8^-$, all checkboxes will be checked again

- Please check that the limits are properly tested:
  For $2^- < J^{\pi} \leq 0^-$ there are 503 nuclides: 481 is wrong
  For $0^+ \leq J^{\pi} < 2^+$ there are 1282 nuclides: 1304 is wrong
  note that 0^- and 0^+ are different states: it seems all 0 spin are counted as even
  There are 352 unknown 351 is wrong (Hs267m is missed)

- in application thumbnails, isomers have always the same colour as the ground state: this is generally wrong.

16) JAERI:
- isomer states have the same colour as the ground state: only in Application thumbnails, not in NE

17) General electric:
- in the legend please change halflife to ½ life and put the text closer to the checkbox

18) Fission Yields:

- Download CSV: if I choose semicolon as separator I get actually colon as separator in the file
- Downloading the graph leads to a server error
- Printing the graph leads to an empty page
- Put a title into the graph: fission parent, fission type, (number of fission products)
- Update the link for the help to *Fission Products and Yields*
- Change **Y(a)** to **Y(A)** and in the following line **Error** to **Error(A)**
- In the last line of the library tab change **Error** to **Error(A)**
- In some case the Chain Yield Graphic button disappears.
- Can we get an option button for 3D representation of (independent and cumulative) fission yield graphs? Like the Nuclide Explorer, we will have the Neutron Number N on the X-axis, the Proton Number Z on the Y-axis and the cumulative or independent Yields on the Z-axis. Selection between Y(I) and Y(C) can be do by an option button, or Y(I) and Y(C) can be represented together using different colours. The isomeric number should be used as subdivision between N and N+1 and Z and Z+1.
- What function does the checkbox "Select all" have?
  It switches off filtering regardless what might be clicked in the fields mass number or half-life. Yes, but this is very confusing for the non-specialist. Can we remove this entirely and replace it with a Reset button next to the "Results".

19) Knowledge Centre, Elements Information: the Browsers *Back* Button doesn't work properly: we get always the Message "Page has Expired … click Refresh". Is there an internet option to suppress this message?
20) Decay Engine:
    - can you use superscript for exponent in text on the graph-axis instead of e.g. t[Years](10^9)?
    - scientific notation for data downloading, with 2 decimals e.g. 2.34E6
    - Downloading the graph leads to server error.
    - Print graph: the page should have a title, a logo, and the used set of decay parameter: nuclide or mixture, quantity, number of time steps, accuracy factor and number of chain and the result table.
    - Following the above procedure I now have the masses arranged – greatest value first etc. Now when I redo the calculation with a new time, the results are shown with no ordering on the mass. In this case the program should have remembered the settings (i.e. arrangement on mass) so that the results with the new time show the greatest mass first etc.
    - When I try to re-arrange with the option Isotopic powers I get internal server error: at now, the server error doesn't occur any more, but ordering doesn't work
    - ~~Rearranging on halflife does not work properly~~ just assume that stable is infinite…
    - Not sure that rearrangement on "Decay Mode" is working properly
    - Total of half lives doesn't make sense…
21) Dosimetry and Shielding
    - Download Excel: in the unit for Γ(mSv.m²,/GBq/h)) the coma is wrong
    - Download CSV: the separator actually used for semicolon is comma.
    - Downloading the graph leads to an error
    - Print graph: the graph can be printed on the same page as the print results.
    - Print: after printing the graph, the data print button will also print the graph
    - Print: add a logo and add the threshold.
    - Print: the isomeric state letter is omitted in the nuclide name (Am242*m*).
    - Place the Redraw graph button in a more useful position - next to the Hide Graph Settings button?
    - Choose a mixture e.g. natural uranium (consists of U238, U235, U234). In the D&S the graph contains all the line in B/W. It would be better to have three different colours – one each for component of the mixture e.g U238, U235, U234

- When we look at Results Details, the first column contains Natural Uranium. This is not necessary since it is printed out at the top of page. In this column we should give the nuclide component e.g. U238 or U235 or U234.
- When I press Show details, the section half-value thickness and number of line extends over the full width of browser. The browser is too wide. In the large table use 2 lines for the column header – this will save lots of space.
- In the table header, use cm² instead cm2 and
- replace µd by µ·d
- Can we get a direct Nuclide mixtures link (like the Nuclide Selector)?
- A new logo for nuclide mixtures? (mortar with rammer, pour from an erlenmayer in beaker, …)

Note to coding of mixed decay modes:

The $RTYP_{primary}$ and $RTYP_{secondary}$ are stored as integer into the column RTYP1 and RTYP2 of the DecayModeInformation Table. $RTYP_{third}$ which appears first in Nucleonica, for just two nuclides, doesn't have its own column yet, but such a column (e.g. RTYP3) can be added at any time to this table.

Technical Appendix:

Nuclide explorer: procedure for displaying multiple and mixed decay modes

By multiple decay mode we are just referring to a nuclide which has more than one decay mode. In the example below, we have 5 decay modes.

In contrast to a pure decay mode (where only a single particle is ejected e.g. α, β, etc.), a mixed decay mode, refer to more than one particle being emitted. In the example below, the ß+,p is a mixed decay mode since both a ß+ and a p are emitted.

1. Determination of the main mode

Before we can determine the main mode, we must list all the decay modes and their branching ratios. In the case of a mixed decay mode, this must be split into its components, where each component gets the same branching ratio as the mixed mode. Consider the nuclide Yb 153 (see appendix). From this information we first construct the following table:

List of decay modes split into components:

Type of decay	**Branching Ratio**
α	0.25
α	0.25
ß+	8E-05
,p	8E-05
ß+	0.24996
ß+	0.24996

Then we build the sum of the branching ratios for each (pure) decay mode and use this list to determine the main mode e.g.

Summing the simple decay modes we get:

ß+	BR=50%	RTYP=2
alpha	BR=50%	RTYP=4
p	BR=0.008%	RTYP=7

The decay mode with the highest branching ratio is the main mode. In the above case, however, we have two main modes (see section Case of two main modes).
(An exception occurs if the secondary decay mode is the same as the primary (e.g. ß+,ß+), the branching ratio for the secondary mode is set to 0.)

Case of two main modes

Normally the main mode is determined by the highest branching ratio. But in the above example, alpha and +ß have both 50% - so what do we do?

In such a case we must use the rule for RTYP: the mode which appears first in the list below becomes the main mode:
ß- =1, ß+/ec = 2, IT=3, alpha=4,n=5,sf=6,p=7, pure ec=8, CE=9

According to this rule, the background colour (main mode) for Yb153 is red. A small (upper) yellow triangle in then used to denote the second most important alpha emission, and a small (lower) brown triangle is used to denote the proton emission.

2. Coding of mixed modes

The coding of mixed decay modes is given by the following formula:

$$RTYP_{mixed} = RTYP_{primary} + (RTYP_{second}*10+m)/100 + (RTYP_{third}*10+n)/10000$$

where m and n are the number of emitted particles for each delayed mode.

Example:

$RTYP_{ß+,p} = RTYP_{ß+} + (RTYP_{proton}*10 + 1_{proton})/100$

$= 2 + (7*10 + 1)/100$

$= 2.71$

Case of Multiple particle emission

Multiple particle emission in the primary mode is transformed as in the following examples:

3n → n,2n (gives an RTYP of 5.52)

or

2ß+ → ß+,ß+ (gives an RTYPE of 2.21)

and then coded with the above formula.

Special cases:

Cluster Emission is coded as 9.x or 9.xx and are all represented with the same colour violet (for which we need a legend box in Karlsruhe theme).

ß-,d : delayed deuteron emission after ß- decay is coded as 1.91

ß-,t : delayed triton emission after ß- decay is coded as 1.92

ß-,d and ß-,t should not be represented on the Nuclide explorer and therefore no colour is defined for this decay modes.

I think this will not blow up the functionality: we work with the same decay modes, just the way to obtain their branching ratio are different and must be implemented...

Appendix 2: Consider, for example Yb 153 which has 5 decay modes

Reference Data Notes

Density	6.90 g/cm^3
Mass Excess	-47059. (± 196) keV
Atomic Mass	152.949480 (± 210) u
Half-life	4.2 (± 2) s
Spin	7/2 ħ
Parity	-
Binding Energy	8.021 MeV/nucleon
Abundance	-
Mean Decay Energies	
Alpha (MeV)	1.94322
Electron (keV)	1155.51
Photon (keV)	1155.51

Type of decay	**Branching Ratio**	**Decay Energy,Q (MeV)**	**Daughters**
α	0.25	4.2571	68 Er 149
α	0.25	3.5153	68 Er 149m
ß+,p	8E-05	6.151	68 Er 152
ß+	0.24996	6.955	69 Tm 153
ß+	0.24996	6.9118	69 Tm 153m